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## Editorial

## THE EARLY HISTORY OF VETERINARY LITERATURE.

AGAIN we are proud to be able to put before the profession another precious landmark of veterinary history, a labour of love and an additional testimony to the wonderful and indefatigable energy of the greatest historian our profession has ever known, Major-General Sir Frederick Smith. No individual man has done more for the profession than Sir Frederick Smith, and no man has had greater difficulties to overcome. Fred Smith's Physiology has been for years the textbook of the student in every College where the English tongue is spoken, but how few of those who studied its pages have ever imagined the almost insuperable difficulties under which it was originally written. The conditions of the Army Veterinary School when Major Fred Smith took over its command, cannot be spoken of in the same breath as the comparatively luxurious advantages which are enjoyed by those at the present well-equipped establishment. Anyone but the man whose energy and love for his profession still continues as great as ever it did would have despaired of ever attaining anything other than a mere reputation for being a good officer; and the self-denials practised by Smith and Butler, and the other pioneers of the scientific base upon which the Royal Army Veterinary Corps is now built, are only known to their few privileged friends.

Now, at an age and time when most other men would be resting on their well-earned laurels, after taking, too, an active part in the greatest of all wars of modern time when already on the retired list, our greatest of all veterinary historians presents to his beloved profession a work which will stand for all time as a monument to his name and to English Veterinary Science.

As a final line we thank him for what he has done and congratulate the readers of the VETERINARY JOURNAL on the opportunity which is presented to them of obtaining this latest landmark of veterinary history as an additional asset to their literary library.

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# General Articles

## AN EXAMINATION OF A NUMBER OF CASES OF OVINE MASTITIS.*

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THE purpose of this article is to record the results obtained in the investigation of a number of cases of mastitis in ewes. The work which has been in progress during the past four seasons, was undertaken in response to representations that the disease was very prevalent in the Eastern Counties, and caused a large number of deaths annually. It was, therefore, reasonable to anticipate that abundant material for examination could readily be obtained. Unfortunately for our purpose, however, these expectations have not been realised. The incidence of the disease during this period has undoubtedly been low, and it has been possible to obtain material from thirty-eight cases only, all of which have occurred more or less sporadically. Nothing in the nature of an extensive outbreak of the disease in a flock has been encountered up to the present. The work is, therefore, only in its preliminary stages, but as it is now interrupted in so far as the present writer is concerned, it is proposed to record the results which have already been obtained.

### History.

Gangrenous mastitis has been termed by French shepherds " Mal de pis " or Araignée.

One of the earliest writers on the subject was Hurtrel d'Arboval[1] (1823), who mentioned that the condition was erroneously believed to be due to the bite of an insect. He described an acute inflammation of the udder, but was unable to explain why the disease was more frequently fatal in sheep than in other species of animals. Kotelman[2] (1836) observed the condition in Prussia in an enzootic form, and gave a full clinical description. Lafosse[3] (1856) described an outbreak occurring near Toulouse and Rivolta[4] (1875) gave an account of a septic form of mastitis occurring sporadically around Pisa. The milk contained a large variety of micrococi and fine bacilli.

Nocard[5] (1886) studied an outbreak at a farm at Joinville and later at Larzac. The condition was, at that time, prevalent in France in an enzootic form. The symptoms and lesions which he described closely resemble those of " black garget " as seen in this country. From the

* This work was carried out in the laboratories of the Department of Animal Pathology, Cambridge.

udder secretion of affected ewes, he obtained a pure culture of an extremely small coccus rather less in size than one of the deeply staining poles of the fowl cholera bacillus. A typical and fatal case of the disease was produced in a lactating ewe by the injection of a culture of the organism by way of the teat canal. Injection of the culture into the gland substance of a goat produced a local reaction. Subcutaneous inoculation was fatal to the lamb, and resulted in local abscess formation, in one case followed by death, in the rabbit. The horse, calf, pig, cat, dog, fowl and guinea pig proved to be refractory when tested by this route. Nocard failed to reproduce the disease by painting the ewe's teat with culture, though he believed the teat canal to be the common channel of infection in natural cases. He considered that the coccus produced a toxin in the animal body which caused a local necrosis, and general toxæmia. It probably survives in the soil and manure of sheep folds, and infection may be spread by shepherds and castrators.

Mathis[6] (1895) isolated from a case of gangrenous mastitis in a goat an organism similar to that described by Nocard. Esser[7] (1889) described the condition in the neighbourhood of Göttingen. Bridré[8] (1907) expressed the opinion that the micrococcus of Nocard is a normal inhabitant of the ewe's mammary gland, and that it produces mastitis only in the presence of some internal lesion of the organ which allows of its rapid multiplication and invasion of the tissues.

This author was successful in immunising ewes by vaccinating them with an attenuated culture of the organism. The mortality among vaccinated animals was 0.4% as compared with 3.35% among the controls.

Pfeiler[9] (1908) confirmed Nocard's findings regarding the etiology of the condition. Gilruth[10] (1910) investigated five cases of mastitis in ewes in New Zealand from which he isolated a coccus indistinguishable in its morphological and cultural characters from that of Nocard, and, in addition, he obtained a small Gram positive anærobic bacillus. The experimental injection of the coccus in pure culture into sheep and rabbits produced results similar to those described by Nocard. The anærobe gave negative results on inoculation, whilst the injection into the ewe's udder by way of the teat canal of the original secretion or of a mixture of the two organisms produced but slight reaction.

Eliore[11] (1922) gave an account of a form of mastitis in ewes caused by the bacillus of Preisz-Nocard which was almost always fatal.

A disease known as Contagious Agalaxia has been recognised for many years among sheep and goats in South West Europe, and Northern Africa. It is characterised by inflammatory lesions of the udder, the eyes and the joints. The cause is a very small organism of

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about the same size as that of bovine pleuro-pneumonia which it resembles in that it passes through certain bacterial filters and can be grown in artificial media.

**Symptoms.**

In the Eastern Counties of England flockowners recognise two clinical forms of mastitis of which " black garget " is the more virulent. The illness is sudden in its onset, runs an acute course, and frequently proves fatal in a short space of time. It is so-named because the affected udder quickly assumes a somewhat dark livid colour. The other type, which is termed " stone garget," includes cases of a more chronic character, which appear to result from a localised infection of the udder. Such cases usually end in recovery of the animal leaving a permanently indurated area of the gland tissue varying in size from that of a broad bean to that of a lemon.

In the early stage of the disease, the ewe is found to remain apart from the rest of the flock. The animal has a dull appearance, the ears droop and there may be a slight lameness in progression, due, no doubt, to an endeavour to relieve the pressure of the hind limbs on the inflamed gland. In acute cases the appetite soon disappears, the visible mucous membranes are injected, the pulse is full and strong and two or more degrees of fever may be registered. In almost all cases the disease is confined to one half of the udder.

On palpation the affected gland is hot, tense, and painful. The early changes in the udder are accompanied by the appearance of subcutaneous œdema which causes a diffuse swelling of the tissues anterior to the gland, and spreads forward along the under surface of the abdomen. The characters of the secretion from the affected half vary according to the stage of infection. For the first few hours the milk is not visibly altered although it contains numerous organisms. After twenty-four hours the secretion changes to a yellowish serous fluid containing small clots or flocculi and cells of various kinds. Later it becomes thickened or more creamy in consistence, due to the presence of large numbers of cells chiefly leucocytes and catarrhal cells.

In very acute cases, death may ensue in from twenty-four to forty-eight hours after the appearance of symptoms. It is nearly always preceded by the onset of diarrhœa. In many cases after about the third day the udder becomes gangrenous. It assumes a dark livid colour which is especially well marked around the teat base. On palpation it is found to be cold and of a doughy consistence, sometimes emphesematous. The secretion is of a dirty reddish colour, and has a putrid odour. In most instances in which gangrene supervenes, the general condition of the animal becomes rapidly worse, and death

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occurs in two or three days. Occasionally, however, the animal survives, in which case the gangrenous portion of the udder sloughs away, and healing slowly takes place.

In the absence of gangrene, an abscess may form in the affected gland, and rupture externally. In such cases, the animal usually recovers, but the affected half of the udder remains in an atrophied and sclerotic condition.

In uncomplicated cases of mastitis, the ewe may show signs of improvement on or after the fifth day of illness. The temperature gradually falls, the appetite returns, and the animal recovers her general health but the udder is never restored to its normal condition after a severe attack. The affected part, when resolution has occurred, shows marked atrophy and sclerosis as a result of the destruction of the glandular elements, and the formation of fibrous tissue. The part thus becomes functionless.

In mild cases, in which the infection is confined to a limited area of the gland tissue, a circumscribed area of induration, the so-called stone garget, is the result.

**Occurence, Incidence and Mortality.**

Mastitis in the ewe is a condition which occurs almost exclusively in the lactating animal. Cases may be seen shortly after lambing commences, and may continue to occur from then onwards until a few weeks after the lambs are weaned.

The incidence of the condition varies considerably in different flocks, and from one season to another. The highest figure encountered in a flock in one season during the course of this investigation was no more than 6%, but one farmer has recently reported that during last lambing season he had 68 cases of which 43 were fatal, in a flock of 394 animals. This is equivalent to an incidence of 17.25%, and a mortality of 10.9% (percentage of death, in affected animals 63.23).

Among the thirty-eight cases actually included in this report there were eighteen deaths—a percentage of 47.36.

*Morbid Anatomy.* On *post-mortem* examination of an animal which has died within the first few days of the onset of symptoms, the affected half of the udder appears more bulky than normal, and the overlying skin may be discoloured. The subcutaneous tissues around the gland, and along the under surface of the abdomen, are in a gelatinous condition, as a result of serious infiltration. On section of the affected udder there is exudation of a serosanguineous fluid mixed with milk. The consistence is more solid than that of normal gland. The cut surface presents an appearance of exaggerated lobulation due to thickening of the interstitial tissue. The changes which are diffuse in character

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are most marked in the early stages in the area adjoining the teat base, indicating that the process is an ascending one. The affected part has a mottled appearance varying in colour from brownish red to dirty yellow, and may show dark areas of blood extravasation or purulent foci of varying size. Strands of fibrinous or purulent material are frequently present in the sinus. When gangrene takes place the tissue becomes emphysematous and is saturated with a thin blood stained fluid having a very offensive smell.

Animals dying of mastitis may show abnormalities of some of the internal organs. The lungs are often congested. The spleen may be slightly enlarged and somewhat softer than normal. The liver and kidneys are hyperæmic and in some cases show cloudy swelling or slight fatty changes. The serous cavities contain a small quantity of blood-stained fluid and may show petechial markings. Definite metastatic lesions were not present in any of the cases examined.

**Histology.**

The changes produced in the udder of the ewe as a result of mastitis are of the acute inflammatory type. The exact appearance presented in any particular case depends on the type of infection and the intensity and duration of the inflammatory process, but there are certain features which appear to be common to all cases at least in the early stages. Of these perhaps the most striking is intense congestion of the blood vessels accompanied by the outpouring of inflammatory exudate rich in fibrin. The presence of this exudate causes a marked thickening of the interstitial tissue between the lobules as a result of which the septa appear as thick bands composed largely of strands of fibrin. Leucocytic migration is always present and in some cases is very marked. Another constant feature is a catarrhal condition of the epithelial lining of the acini and milk ducts. The infecting organisms are scattered abundantly throughout the inflamed tissue, in many parts of which they are seen grouped together in clumps. It is in the neighbourhood of these clumps that the tissue changes appear to be most marked. In cases which have succumbed to the very acute form of staphylococcic infection there is considerable destruction of the glandular tissue. Necrosis affecting whole groups of acini may be seen. Many of the epithelial cells are shed and lie scattered within the lumen which also contains finely granular material and clumps of cocci. Where necrosis has not occurred there is simple desquamation. Here and there some of the cells that remain attached to the walls commence to proliferate, and where this occurs the acini becomes more or less completely filled with masses of cast-off cells together with a few leucocytes. Marked blood extravasation may be present in some

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areas. The milk ducts are filled with a cellular exudate mixed with fibrin. In cases of three or four days duration the migration of leucocytes is more marked and there is evidence of the formation of small abscesses and commencing proliferation of connective tissue. In streptococcic mastitis the changes are very similar to those already described. There is intense congestion of the blood vessels, with local extravasation of red cells and marked thickening of the septa due to the presence of fibrin. Areas of the gland tissue may be completely necrosed but these are not so extensive as in staphylococcic infection. On the other hand proliferation and desquamation of the epithelial cells is in general more marked. These changes are accompanied by the migration of polyneuclear leucocytes in considerable numbers, and by the early formation of definite small abscesses in the inflamed tissue.

In cases due to bipolar infection the blood vessels are very congested and the septa distended with fibrinous exudate. The acini show acute catarrhal changes accompanied by proliferation of the epithelium and tend to become filled with cellular exudate together with a variable proportion of fibrinous or granular material. Migration of leucocytes is not so well marked as in the other types of infection, and there is little or no necrosis of the gland tissue.

No material was available for examination from natural cases dying as a result of a pure infection by an organism of the coliform type. In two experimental cases the changes in the udder were mainly of a catarrhal nature. Exudation into the interstitial tissue was not so marked as in other types of infection. The chief features were proliferation and desquamation of the lining cells of the acini together with considerable leucocytic migration. In one of the cases which survived until the tenth day the leucocytes were present in very large numbers and there was evidence of fibroblastic multiplication.

**Methods of Examination.**

Every effort has been made to obtain material for examination as early as possible in the course of the disease.

In some cases we have been able to do this within a few hours of its commencement, and in many within forty-eight hours. A few cases however, are included in which the attack had lasted some days or even weeks, but any in which the interior of the udder was exposed during life have been discarded. Ordinarily the practice has been to collect and examine samples of udder secretion and sometimes blood. Where opportunity has occurred a further examination has been made *post-mortem*. The method adopted in taking samples of udder secretion was the following. The udder was first washed with 5% lysol solution, particular attention being paid to the tip of the teat which was after-

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wards swabbed with tincture of iodine. The first few gushes of secretion were discarded, and a sample was then taken in the usual manner into wide-necked sterile bottles. Smears were prepared (a) direct from the secretion (b) from the deposit after centrifuging. These were stained by the ordinary methods and examined for the presence of organisms. Cultures were made on various media including slopes of agar and serum agar, glucose broth, meat broth and liver broth. The two latter media were boiled for some minutes and then cooled down rapidly before inoculation. A loopful of the secretion was ordinarily found to be a sufficient quantity of inoculum to give rise to a rich growth. In the case of solid media, subinoculations were made in series so as to obtain suitable dilutions. Inoculations were carried out in duplicate so as to allow of incubation under both aerobic and anaerobic conditions. Wherever possible a further set of tubes was inoculated with a similar quantity of secretion from the healthy side of the udder, but with the exception of two cases in which a few isolated colonies developed, no growth was obtained.

In cases of *post-mortem* examination cultures have been made from the udder tissue, the heart's blood and various organs of the body, especially the liver and kidney.

**Bacteriology.**

In the majority of instances in which a sample of secretion has been obtained in the early stages of the disease, a pure culture of an organism has been isolated, whereas in those taken after a longer period of illness two or more organisms have not infrequently proved to be present. Two samples (Nos. 27 and 36), both of which were from cases of some standing, yielded no growth. This may have been due to the infection having been overcome at an earlier stage. The organisms obtained from the remaining thirty-six cases comprise staphylococci (24 times) streptococci (8 times), coliform bacteria (7 times), bipolar organisms (4 times), diphtheroids (3 times) and cocco-bacilli (once). The bacteriological findings in each case are set out in Table I.

In Table II they are grouped according to the respective flocks in which the cases occurred.

**Characters of the Principal Organisms Staphylococci.**

Staphylococci were the commonest type of organism encountered in this investigation. They were isolated from twenty-four of the thirty-six cases from which growth was obtained. In fifteen of these they were present in large numbers in a state of purity, and in the remaining nine they were mixed with other organisms. All strains resembled Staphylococcus pyogenes in their general properties, especially as regards their morphology, cultural characters and staining

**Table I.**

| Case Number. | Organisms Isolated. | | | | | | | Remarks. |
|---|---|---|---|---|---|---|---|---|
| | Staphylococci. | Streptococci. | Coliform. | Bipolar. | Diphtheroid. | Cocco-bacilli. | No Growth. | |
| 1 | +(c) | +(b) | +(a) | | | | | Survived. |
| 2 | | | + | | | | | Survived. |
| 3 | + | | | | | | | Died. |
| 4 | | | + | | | | | Survived. |
| 5 | + | | | | | | | Died. |
| 6 | | + | | | | | | Died. |
| 7 | +(b) | | | | | +(a) | | Survived. |
| 8 | +(a) | +(b) | | | | | | Died. |
| 9 | +(a) | +(b) | | | | | | Died. |
| 10 | + | | | | | | | Survived. |
| 11 | + | | | | | | | Died. |
| 12 | + | | | | | | | Died. |
| 13 | | + | | | | | | Died. |
| 14 | + | | | | | | | Died. |
| 15 | + | | | | | | | Died. |
| 16 | + | | | | | | | Destroyed. |
| 17 | | | + | | | | | Survived. |
| 18 | +(a) | +(b) | +(c) | | | | | Survived. |
| 19 | + | | | | | | | Died. |
| 20 | + | | | | | | | Destroyed. |
| 21 | | | + | | | | | Destroyed. |
| 22 | | | + | | | | | Survived. |
| 23 | + | | | | | | | Destroyed. |
| 24 | + | | | | | | | Died. |
| 25 | +(b) | +(a) | | | | | | Died. |
| 26 | +(a) | +(b) | | | | | | Died. |
| 27 | | | | | | | + | Destroyed. |
| 28 | | | | + | | | | Died. |
| 29 | | | | + | | | | Died. |
| 30 | | | | + | | | | Survived. |
| 31 | + | | | | | | | Died. |
| 32 | +(b) | | | | +(a) | | | Survived. |
| 33 | + | | | | | | | Survived. |
| 34 | +(b) | | | | +(a) | | | Survived. |
| 35 | | | | | + | | | Survived. |
| 36 | | | | | | | + | Survived. |
| 37 | + | | | | | | | Destroyed. |
| 38 | | | | + | | | | Died. |

*Note.*—In the case of mixed cultures the letters (a), (b) and (c) are used as an indication of the relative number of colonies of each type of organism that appeared on solid media, thus (a) means the largest number of colonies, (b) a smaller number than (a), and (c) a smaller number than (b).

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reactions. They were tested as to their chromogenic power by growth on potato. Twenty-three appeared to be of the albus variety although after standing for several days the colour tended to change to a dirty white and in some cases to a dirty yellow, but not to the golden or lemon colour typical of the other varieties of S. pyogenes. The remaining strain was S. pyogenes citreus. Gelatin was liquefied in every case. Nearly all strains acidified litmus milk and fifty per cent. of them produced a clot which later became digested.

**Table II.**

| Flock. | Season. | Number of Cases. | Staphylococci. | Streptococci. | Coliform. | Bipolar. | Diphtheroid. | Mixed Culture. | Negative. | Description of Mixed Cultures. |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1925 | 1 | | | | | | 1 | | Staph. Strept. Coliform. |
| A | 1926 | 4 | 3 | | 1 | | | | | |
| | 1927 | 1 | | | | | | 1 | | Staph. Strept. |
| | 1925 | 1 | | | 1 | | | | | |
| B | 1926 | 3 | 2 | | | | | 1 | | Staph. Strept. |
| | 1927 | 2 | 1 | | | | | 1 | | Do. |
| | 1928 | 1 | 1 | | | | | | | |
| C | 1925 | 1 | | | 1 | | | | | |
| D | 1926 | 6 | 2 | 2 | | | | 2a & b | | (a) Staph. Cocco-bacillus. (b) Staph. Strept. Coliform |
| E | 1926 | 2 | 1 | | | | | 1 | | Staph. Strept. |
| F | 1926 | 1 | 1 | | | | | | | |
| G | 1926 | 3 | 1 | | 2 | | | | | |
| | 1927 | 1 | | | | | | | 1 | |
| H | 1927 | 3 | | | | 3 | | | | |
| | 1928 | 1 | | | | 1 | | | | |
| I | 1928 | 1 | 1 | | | | | | | |
| J | 1928 | 5 | 1 | | | | 1 | 2 | 1 | Staph. and Diphtheroid (in both cases). |

### Carbohydrate Fermentations.

Tests were carried out in peptone water medium using litmus as an indicator. The various strains when freshly isolated did not appear to be identical in their action on carbohydrates (see Table III). Only

## Table III.

FERMENTATION REACTIONS OF STAPHYLOCOCCI AT THE TIME OF ISOLATION.

| Number of Case. | Source. | Arabinose | Dextrin. | Dulcite. | Glucose. | Glycerin. | Inulin. | Lactose. | Laevulose. | Maltose. | Mannite. | Saccharose. | Salicin. | Litmus Milk. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Udder Secretion. | A | A | — | A | — | — | A | A | A | A | A | — | — |
| 3 | ,, | — | A | — | A | A | — | A | A | A | A | A | — | — |
| 5 | ,, | — | — | — | A | — | — | A | A | A | A | A | — | AC |
| 7 | ,, | A | A | — | A | A | — | A | A | A | A | A | — | — |
| 8 | ,, | A | A | — | A | As | — | A | A | A | A | A | — | A |
| 9 | ,, | — | A | — | A | As | — | A | A | A | A | A | — | A |
| 10 | ,, | — | A | — | A | — | — | A | A | A | A | A | — | AC |
| 11 | ,, | — | A | — | A | As | — | A | A | A | A | A | — | AC |
| 12 | Udder and Blood. | — | As | — | AG | — | — | AG | AG | AG | AG | AG | — | AGC |
| 13 | Udder Secretion. | As | A | — | A | As | — | A | A | A | A | A | — | A |
| 14 | ,, | As | A | — | A | — | — | A | A | A | A | A | — | A |
| 14 | Blood. | As | A | — | A | — | — | A | A | A | A | A | A | A |
| 15 | Udder Secretion. | — | A | — | A | — | — | A | A | A | A | A | — | AC |
| 16 | Udder and kidney | As | A | — | A | As | — | A | A | A | A | A | — | AC |
| 18 | Udder Secretion. | As | A | — | A | A | — | A | — | A | A | A | — | A |
| 18 | Blood. | As | A | — | A | As | — | A | A | A | A | A | — | A |
| 19 | Udder Secretion. | As | A | — | A | A | — | A | A | A | A | A | — | AC |
| 20 | ,, | — | — | — | A | — | — | A | A | A | A | A | — | AC |
| 23 | ,, | As | A | — | A | A | — | A | A | A | — | A | — | A |
| 24 | ,, | — | — | — | A | As | — | A | A | A | A | A | — | AC |
| 25 | ,, | — | — | — | A | As | — | A | A | A | A | A | — | AC |
| 37 | Udder and Blood. | — | — | — | A | A | — | A | A | A | A | A | — | AC |

A = Acid. As = Slight Acid Production. G = Gas. C = Clot.

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very slight differences were, however, observed when a number of them were retested at a later date after they had been kept in artificial culture for several generations (Table IV). They produced acid in

**Table IV.**

FERMENTATION REACTIONS OF STAPHYLOCOCCI AFTER SEVERAL SUBCULTIVATIONS.

| Number of Case. | Source. | Arabinose. | Dextrin. | Dulcite. | Glucose. | Glycerin. | Inulin. | Lactose. | Laevulose. | Maltose. | Mannite. | Saccharose. | Salicin. | Litmus Milk. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Udder Secretion | — | — | — | A | — | — | A | A | A | A | A | — | A |
| 3 | ,, | — | — | — | A | — | — | A | A | A | A | A | — | AC |
| 5 | ,, | — | — | — | A | A | — | A | A | A | A | A | — | A |
| 11 | ,, | — | — | — | A | A | — | A | A | A | A | A | — | A |
| 19 | ,, | — | — | — | A | A | — | A | A | A | A | A | — | AC |
| 8 | ,, | — | — | — | A | As | — | A | A | A | A | A | — | A |
| 9 | ,, | — | — | — | A | As | — | A | A | A | A | A | — | AC |
| 10 | ,, | — | — | — | A | As | — | A | A | A | A | A | — | AC |

glucose, laevulose, lactose, maltose, mannite, saccharose and in some cases in glycerin, but had no effect on dulcite, inulin, salicin, arabinose and dextrin. Reference may here be made to the work of Jones[12] on bovine mastitis in the course of which he isolated staphylococci of various chromogenic characters from some of his cases. Eleven of his strains produced acid in glucose, maltose, mannite, saccharose, salicin and inulin, whilst eight others differed in that they gave negative results with salicin and inulin. Litmus milk was coagulated except in two cases.

**Pathogenicity.**

Two of the strains (from cases 19 and 20) inoculated subcutaneously into guinea pigs produced local abscesses at the site of injection. After these had ruptured, healing took place rapidly, and the animals showed no further ill effects. Strain (Case 19) on subcutaneous inoculation into a rabbit produced a marked local reaction with abscess formation and proved fatal in three days. Strain (Case 20) caused severe inflammation of the subcutaneous tissues and abscess formation but in this case the rabbit survived and the lesion was completely healed after sixteen days.

On 31.10.28 a lactating ewe received an injection into one half of the udder by way of the teat canal of 1.5 c.c. of a 24 hours broth culture of staphylococcus isolated from Case 37. Five hours later the

injected side was swollen, hot and painful. The following day the subcutaneous tissue in the neighbourhood of the gland became swollen and œdematous and this condition gradually spread along the abdomen to the fore legs. The skin of the udder assumed a livid colour and showed blister-like elevations. Later it became cold to the touch, the animal appeared very distressed and her condition rapidly became worse. She was killed on 3.11.28, when *in extremis*. On *post-mortem* examination the injected half of the udder presented an appearance similar to that seen in naturally occurring cases of the disease. The other half appeared normal. The organism was recovered in pure culture from the affected part of the udder. Cultures made from the heart's blood gave rise to no growth. The histological appearance of the udder tissue was indistinguishable from that seen in acute natural cases of staphylococcic mastitis.

### Streptococci.

Organisms of this type were isolated from eight cases but were present in a state of purity in only two of these. The various strains with two exceptions differed among themselves in their action on carbohydrates. The strains from Cases 6, 8 and 18 were the only ones that proved to be hæmolytic. Details of the sugar reactions are given in Table V.

**Table V.**

FERMENTATION REACTIONS OF STREPTOCOCCI.

| Number of Case. | Source. | Arabinose | Dextrin. | Dulcite. | Glucose. | Glycerin. | Inulin. | Lactose. | Laevulose. | Maltose. | Mannite. | Saccharose. | Salicin. | Litmus Milk. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Udder Secretion | A | | — | A | | — | A | A | A | — | A | A | A |
| 6 | ,, | A | — | — | A | — | — | — | A | A | — | A | — | — |
| 8 | ,, | — | A | — | A | — | — | A | A | A | — | A | A | — |
| 9 | ,, | A | A | — | A | — | — | A | A | A | — | A | — | A |
| 13 | ,, | A | — | — | A | — | — | A | A | A | A | A | A | — |
| 18 | ,, | A | A | — | A | — | A | A | — | A | A | A | A | A |
| 25 | ,, | A | A | A | A | A | A | A | A | A | A | A | A | AC |
| 26 | ,, | A | A | A | A | A | A | A | A | A | A | A | A | AC |

### Pathogenicity.

Three strains (Cases 6, 8 and 9) proved to be non-pathogenic to mice on subcutaneous inoculation. In guinea pigs they produced local abscesses which quickly healed after rupture had taken place. The organism from Case 13 was injected into the teat of a lactating guinea

pig but produced no ill effects. That obtained from Case 1 was injected via the teat canal into the udder of a lactating ewe. The dose given was 1 c.c. of a broth culture. Twelve hours later the injected part was swollen but did not appear to be markedly painful until the third day. In the meantime the animal's temperature had risen to 105° F. On the fourth day the inflammation began to subside, and three days later the only abnormality that could be detected was the presence in the udder of a circumscribed lump of the size of a walnut.

### Coliform Organisms.

Seven of the cases yielded a growth of gram-negative bacilli. In five of these the organisms were present in a state of purity. The morphological and cultural characters in all cases resembled those of the colon-typhoid group of bacteria. The various strains, however, showed marked differences among themselves in their action on carbohydrates and none of them could be identified with any of the commonly recognised members of that group of organisms. Four of the strains were definitely motile. The reactions are shown in Table VI.

**Table VI.**

COLIFORM ORGANISMS.

| Number of Case. | Source. | Arabinose. | Dextrin. | Dulcite. | Glucose. | Glycerin. | Inulin. | Lactose. | Laevulose. | Maltose. | Mannite. | Saccharose. | Salicin. | Litmus Milk. | Motility. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Udder Secretion. | A | | — | A | A | As | A | A | A | A | A | | — | + |
| 2 | ,, | — | | — | A | — | — | — | A | A | As | A | As | — | ? |
| 4 | ,, | — | — | — | A | — | — | A | As | | A | A | — | — | + |
| 17 | ,, | As | — | — | As | — | — | — | As | As | As | A | — | As | — |
| 18 | ,, | AG | — | AG | AG | A | — | AG | AG | AG | AG | — | — | AG | + |
| 21 | ,, | A | A | — | — | — | A | — | A | — | — | A | — | — | ? |
| 22 | ,, | A | — | — | — | — | A | — | A | A | — | A | — | — | + |

### Pathogenicity.

Only a very few tests were carried out. The strain from Case 4 proved to be non-pathogenic to mice on subcutaneous and intraperitoneal inoculation. That from Case 22 produced an abscess in a guinea pig at the site of injection under the skin. An experimental lactating ewe No. 66 received an injection into the udder by way of the teat canal of 1 c.c. of a broth culture of the strain from Case 1. The animal showed acute inflammation of the injected half of the gland 18 hours later. By the forty-eighth hour the secretion had changed to a sero-

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sanguineous fluid. On the fifth day there was evidence of acute diarrhœa, the appetite was completely lost and the temperature was 105° F. The udder was cold and doughy to the touch. Death took place on the tenth day. On *post-mortem* examination the affected half of the udder showed on section a greyish brown colour. A sero-sanguineous fluid exuded from the cut surface. Abscesses were present in several of the mesenteric glands and there was an accumulation of purulent material in the uterine horns. The cortex of the left kidney showed a small necrotic focus and the lungs were congested and showed areas of pneumonia. The injected organism was recovered from the udder and kidney. The histological appearance of the udder of this animal has already been described.

A similar experiment was carried out with the strain isolated from Case 2. A lactating ewe No. 67 was given an injection via the teat canal of 1 c.c. of a broth culture of the organism. Forty-eight hours later the injected half of the udder was hot, swollen and painful. The temperature rose to 107° F. The animal died on the fifth day. The *post-mortem* appearance of the udder tissue was similar to that of the preceding case. The liver and kidneys showed slight fatty change but the other organs appeared normal. The organism was recovered in culture from the udder but not from the other organs.

### Bipolar Organisms.

Organisms of this type were isolated in pure culture from four cases of mastitis, all of which occurred in one flock. The four strains were exactly alike in their general characters which were those of the Pasteurella group.

### Description.

Small gram-negative bacilli showing distinct bipolar staining. On the surface of agar the colonies were small, discrete and white and showed little tendency to spread. In broth a fine uniform turbidity was produced, and partial sedimentation occurred on standing. No gas was produced from carbohydrates, but acid was slowly formed from some of them. Little or no change could be observed until the third day. After seven days' incubation, acid formation was distinct in dextrin, glucose, laevulose, maltose, mannite and saccharose, and slight in lactose and glycerin. There was no change in arabinose, dulcite, inulin, salicin and litmus milk. The organism at the time of isolation failed to kill rabbits on subcutaneous inoculation in doses up to 4 c.c. of broth culture. In one case the inoculum used consisted of 3 c.c. of udder secretion from Case 30 but no ill effects were produced.

### The Normal Flora of the Ewe's Udder.

In connection with this work a number of tests have been carried

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out to obtain an indication of the extent to which organisms are harboured in the udder of apparently normal ewes.

It has frequently been observed in the case of the cow that the normal udder and especially the milk cistern and teat canal contains organisms of various kinds which apparently are able to maintain themselves in limited numbers in those positions but without causing any harmful effects. For instance, D'Heil[13] reported the finding of such organisms in cows that were regularly milked. Miss Evans[14] records the presence in the cow's udder of a variety of organisms such as are present on the mucous membranes of man and animals. Heinemann[15] obtained growth from 30 out of 45 samples of cows' milk that were drawn with strict aseptic precautions, the amount of inoculum used being 0.2 c.c. in each case.

The udders of six normal ewes were examined *post-mortem* for the presence of bacteria. Cultures were made from the interior of the gland tissue itself, from the milk sinus and the teat canal. The gland tissue proved to be sterile in each case, but in four instances a small number of colonies of various kinds were obtained both from the milk sinus and teat canal. The organisms isolated from the sinus were staphylococci, gram positive bacilli and cocco-bacilli and from the teat canal, staphylococci, streptococci and coliform bacilli.

Thirteen samples of milk were taken from normal ewes with the same aseptic precautions as were adopted in obtaining material for examination from cases of mastitis. A platinum loopful of sediment resulting from the centrifuging of 2 c.c. of milk was used as inoculum. In one case a growth of staphylococcus resulted and the remaining samples were sterile.

As a result of plating out on lemco agar 0.1 c.c. of milk from three ewes which had been prevented from suckling their lambs for a period of four hours the number of colonies obtained was five, three and two respectively. From three other ewes running with their lambs, the same quantity of secretion yielded three, three and nine colonies respectively.

Again, organisms were found to be present in the teat canal of seven ewes running with their lambs. The method of examination consisted in passing a blunt sterile probe into the canal after thoroughly cleansing the orifice, and then washing the probe in tubes of sterile broth. As a result, staphylococcus albus was obtained in four cases, a gram positive bacillus in two, whilst the remaining one yielded a mixture of staphylococcus and a coliform bacillus.

These results indicate that organisms are frequently present in the milk sinus and teat canal of normal lactating ewes. The majority of such organisms are excreted with the first part of the milk.

(*To be continued.*)

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# Clinical Articles

## Amputation of the Tongue in the Horse.

By C. W. ELAM, M.R.C.V.S., D.V.H. and R. ISHERWOOD, M.R.C.VS.,
*University of Liverpool.*

In The Veterinary Journal of March, 1926, Mr. Elam reported under " Clinical Articles " a case in which the amputation of the whole of the free portion of the tongue of a horse suffering from bi-lateral paralysis of that organ, was successful in restoring the animal to an unqualified usefulness. This case has been carefully watched from the time of the operation to the date when destruction was decided upon on account of chronic lameness in March, 1929. The animal was in excellent bodily condition at this date, four years after the operation.

Fig. 1.—Illustrating the absence of the end of the tongue.

The second case is that of a grey cart mare, aged twelve years. Unlike what obtained in the first case, the onset of the paralysis of the tongue was gradual, and it was only after three days that the tongue became immobile and protruded to the full extent. Here again there were no other symptoms of nervous derangement, and apart from the local symptom the animal appeared to be in perfect health. After seven days the free portion of the tongue was much swollen and there was ample evidence of commencing necrosis. An operation similar to that applied to the first case was performed, and six days later it was found necessary to remove two upper and two lower molars, as they were causing injury to the remaining portion of the tongue in its swollen condition. In three days time the animal was able to take a little bran mash. The improvement in capacity to feed was a rapid one, and after five weeks from the commencement the animal was returned to work. No special after-treatment was necessary in this case, and the

animal did not receive preferential treatment in respect of work. The photographs were taken twelve months after the performance of the operation, and are evidence of the good bodily condition of the patient.

Points of interest in these cases are :—

(1) The origin of the paralysis. There was no evidence in either instance that the tongue had been roughly handled, nor was there any trace of inflammatory disease of the organ itself, nor of tissues in close proximity. The most likely cause seemed to be pressure due to hæmorrhage at the points of origin of the hypoglossal nerves. This would appear to be more evident in the first case, in which the tongue was described as " dropping out " during work. Rather against this opinion is the entire absence of other nervous disabilities which one would have expected in a paralysis of the tongue of central origin.

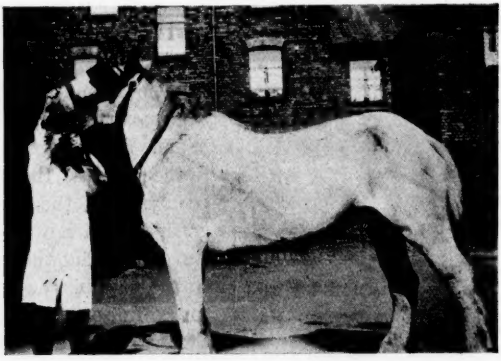

FIG. 2.—Illustrating the good bodily condition.

(2) The fact that the amputation of the free portion of the tongue almost immediately removed total inability to feed in these two cases goes to prove that it is not the paralysis of the tongue which is the chief hindrance to mastication and deglutition, but rather the swollen free portion which acts as a foreign body placed between the rows of teeth. The alternative to amputation therefore, is to subject the animal to the risk of extension of the necrotic area and of fatal septicæmia at the worst, and to lose a good deal of bodily condition at the best, with no better result in the end.

(3) The amputation of the free portion of the tongue can be undertaken without fear for the animal's usefulness in the future, and having regard to the success of the operation and the simple nature of its technique, it is inadvisable to delay the operation longer than the commencement of the necrotic process.

(4) Both these cases were of aged animals, and in the ordinary way suffering from this complaint they would have been destroyed as incurable, whereas at least five years of working life was added. In the case of young animals and pedigree stock the financial saving would be much more marked.

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## Canine Ringworm in Man.*

By ARTHUR WHITFIELD, M.D.,
*Harley Street, W.*

THE species or varieties of fungus causing what is broadly called ringworm vary in different countries. In France ringworm of the dog appears to be comparatively common and ringworm of the cat rare, whereas in England ringworm of the dog appears to be comparatively rare and ringworm of the cat common.

This distribution in the lower animal is naturally reflected in the variety which is communicated from the lower animal to man, and whereas I see a fair sprinkling of cases of ringworm derived from the cat (two cases in the first quarter of this year) it is many years since I have seen human patients infected from dogs.

In all these cases, both dog and cat, the variety is that classed by dermatologists as microsporum. The common human ringworm is known as microsporum Audouini, though there are a few rare sub-varieties known, that of the cat, first cultivated and named by Colcott Fox and Blaxall, as microsporum felis, and that of the dog, described by Sabouraud, as microsporum Canis vel lanosum.

Ringworm in the lower animal is of interest to the doctor as well as the veterinary surgeon, since it is obvious that an infected animal may form the source of one or more epidemics, and unless it be detected and dealt with the disease will not be stamped out.

It may be of interest to point out here that the intensely inflammatory ringworm in man, derived from the cow and horse, sets up an immunity in man and although this immunity is variable, sometimes enduring for years though on rare occasions being very transitory, it has some influence in limiting the spread and a notable one in rendering the treatment easier.

The microsporum varieties of ringworm on the other hand, set up inflammatory reactions of only the most trivial kind, and do not appear to call forth any marked degree of immunity, so that cure may be more difficult, and there is little tendency towards spontaneous disappearance of the epidemic.

The question whether the microsporum of the cat and dog after

* See also Professor Wooldridge's article, pages 306 *et seq.*

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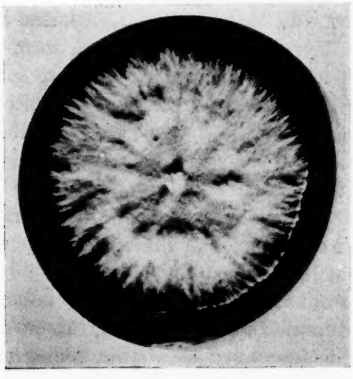
transference from the lower animal to the human being can then be transferred from one human to another can be answered in the affirmative. I have, during this year, seen a lady who was infected on the cheek by kissing her daughter. The daughter had been infected by her kitten, and all three cases were seen by me and the ringworm identified in the hair of the kitten's nose and that surrounding the eye.

A second question that arises is "Can microsporum of animal origin be either diagnosed as such or strongly suspected in man?"

The answer to this is in the affirmative.

All microsporum ringworms attack both the glabrous skin and the hairy scalp in man, though the attack on the scalp is practically limited to children below the age of sixteen. On the glabrous skin, however, the microsporum audouini (human) flourishes badly. It produces small red scaling areas, usually about a quarter of an inch in diameter, and practically never forms rings. These small patches usually die away spontaneously in a few days, and are very seldom found elsewhere than on the face, neck and upper shoulders.

Both microsporum felis and m. lanosum flourish readily on the glabrous skin, and form bold, erythematous, scaling and sometimes vesiculating rings, which are moderately persistent. When once they have attacked the hairy scalp I am unable to distinguish them from the human variety with any degree of certainty. I am in the habit, therefore, of asking where the ringworm was first noticed, and if the answer is that many rings were seen on the body at the beginning, I know I am dealing with an animal microsporum.



Tertiary culture from the skin of the human being infected with microsporum canis. Age of culture seventeen days. Medium, Sabouraud's Maltose "proof" Agar. Note the radiate appearance of the disc and the curly, wool-like surface.

The three cases lately seen by me, sent by Prof. Hobday, of ringworm of the dog communicated to the human being, may, perhaps, merit description in some detail.

All three were young adult women veterinary students who had been dressing some infected dogs.

The lesions were on the forearms, were intensely irritable, and showed as bright red rings varying in size from a third to three quarters of an

inch in diameter. The centres of the rings were involuting spontaneously, and the horny layer was evenly ripped up into a scale with the free edge pointing towards the centre of the ring, and beneath this scale the reddened epidermis was just moist, but there was no sign of pus. The evenness of the desquamation is worthy of note as in most cases of ringworm of the skin the scaling or vesiculation is rather in a series of points resembling a ring of beads than in an even collarette. As this characteristic was present in all of the three cases, it may be of diagnostic significance in determining the source of infection.

Microscopic examination of the cigarette-paper-like scales revealed immediately a felt work of hyphae, the joints of which were of a narrow oblong shape. This is always the case with the microsporum varieties, but is found also in some parts of other ringworm growth on the glabrous skin.

Pieces of the scale were cut into small pieces with a sterile knife and implanted on Sabouraud's Maltose agar. Growth was visible in three days and developed rapidly in pure culture.

This extreme rapidity of growth of the animal microsporums in artificial culture was noted by Sabouraud many years ago, and he named the fungi "Cultures vivaces." It is quite possible that this feature has some relationship to the extreme contagiousness of microsporum of the animal to the human being, the other factor being, in all probability, the ease with which the infected hair of the animal is shed.

As an instance of this extreme contagiousness I may cite the following history of a kitten and its victims noted by me in 1914.

A long-haired kitten was brought from a farm-house in Devonshire as a Christmas present for some children in Beaconsfield. It was taken to Exeter where it stayed the night, and on the following day it was taken to London, where it stayed a second night, and on the third day it was taken to Beaconsfield to the children. There was no contact with children in the Exeter and London houses, but in both places adults were infected on the glabrous skin, while in Beaconsfield all three children developed a profuse eruption on the glabrous skin, and an obstinate infection of the hairy scalp.

As regards the description of the culture the following features may be noted.

All the microsporum fungi give rise to "downy" rather than "powdery" cultures.

But whereas the human variety, "microsporum audouini" shows no radiations on the disc but merely a certain amount of folding, usually four or five deep radial folds resembling a hot cross bun, the microsporums of the cat and dog show marked radiation (especially

that of the cat) and little or no folding. That of the dog also shows a rougher and more woolly appearance than that of the human, hence Sabouraud's name " microsporum lanosum.'

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## Ringworm in Two Dogs, Transmitted to Human Beings.

By G. H. WOOLDRIDGE, F.R.C.V.S.,

*Professor of Medicine and Clinical Parasitology, Royal Veterinary College, London.*

THE patients were two sealyham terrier bitches, the property of the same owner, from a kennel of upwards of a dozen dogs all affected with the same condition.

The history accompanying was that all the animals had been under treatment for a period of months by the local Veterinary Surgeon, who forwarded the above two animals to the College as interesting

cases. The condition in some had shown improvement, only to be followed by retrogression. The persons handling the animals had developed lesions on the arms, which, however, had readily yielded to treatment.

Examination showed both dogs to be in good condition, apart from the skin lesions. The latter showed, more or less all over the body but

* I am indebted for the photographs to Mr. J. W. Holmes, M.R.C.V.S., D.V.S.M., Clinical Assistant to the Medical Department.

particularly on the head and back, lesions varying in size from a three-penny-piece to a penny; much raised and hairless, with accumulated scabs. On removal of the scabs there were in some cases small sinuses from which could be expressed a small amount of blood-stained fluid. The skin between these areas was very scurfy. Diagnosis—ringworm.

The animals were in hospital for a period of five weeks, at the end of which time they were returned home for further treatment. Marked improvement was noted, but the skin was, as yet, by no means normal. The treatment adopted was the application of salicylic liniment (1—16) to the whole of the body during the first fortnight, and this was followed later by local treatment with vetiod and tincture of iodine.

An unfortunate but interesting feature was the fact that two lady students, who dressed the cases, developed lesions on their arms (see photos). Several dogs, which were in the infirmary at the time and were dressed by the same students, developed typical lesions of ringworm; which, however, readily responded to treatment with tr. iodi. A member of the secretarial staff using the same towel as the affected students also developed a ringworm on the face. The three were sent to Dr. Whitfield, who confirmed the diagnosis and demonstrated the parasite. Reference to these cases is made in Dr. Whitfield's contribution.*

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## Linguatula Serrata in the Nasal Cavity of a Dog.

By NOEL PILLARS, F.R.C.V.S.,

In this country at least it is comparatively rare that one has an opportunity of observing adult linguatuliasis in the living animal. The following notes of such a case which I saw with Mr. P. T. Lindsay, M.R.C.V.S., on April 28, this year may therefore be of some interest. The subject was an old English sheep dog which had been purchased and brought into town in August last year. There was a small abrasion on the wing of the right nostril caused by constant rubbing along the floor. Marked sneezing took place when the animal frisked and galloped about. There seemed to me to be a strong desire to rub the nose on the clothes of anyone within reach. No epistaxis was observed, and two samples of mucus sneezed on to the kennel partitions were negative on microscopic examination. On May 4, however, a small string of material taken from the right nostril contained numerous eggs. They were amber coloured and the average measurements of a series were $100 \times 63\ \mu$. They are shown in Figs. 1 and 2, which are low and high power views respectively. On comparing them with eggs actually taken from *Linguatula serrata*, no differences could be detected, and as

* See Dr. Whitfield's article, pages 303 *et seq.*

apparently there is only one tongue worm in this country, it is suggested that this was the species in the present case. Fantham, Stephens & Theobald (1) give the measurements of the eggs as 0.09 $\mu$. in length, and 0.07 $\mu$. in breadth. This is an error, and should, apparently, read .09 mm. in length and .07 mm. in breadth, which it will be seen is equivalent to 90 and 70 $\mu$. respectively ; that is to say, a little more rounded than in this case.

An attempt was now made to illuminate the nasal cavity, but it proved to be both difficult and unsatisfactory. On May 6, twenty drops of pure chloroform were instilled into the affected nostril. It was not easily carried out in a thorough manner, but caused marked sneezing and a large amount of froth to come from the nostrils and mouth. The parasite was, however, not expelled.

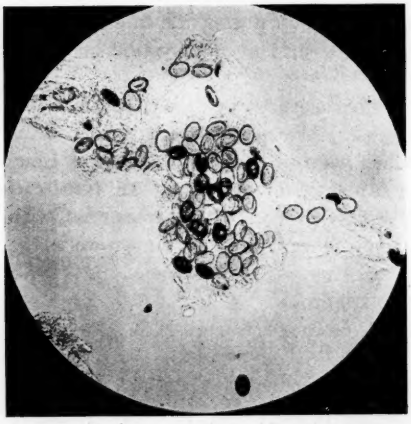

FIG. 1.—A group of pentastome eggs in nasal discharge. × 40.

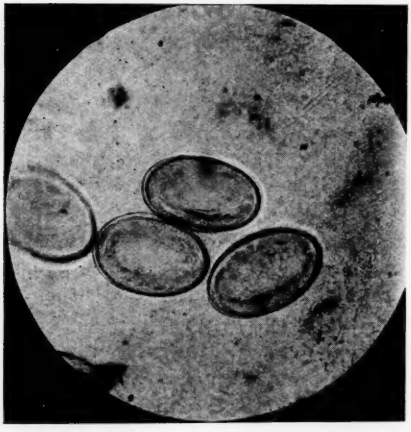

FIG. 2—A group of pentastome eggs in nasal discharge. × 220.

In the absence of exact knowledge as to the position of the "worm," attempts at snaring or surgical intervention were thought to be undesirable at this juncture.

On May 8 the patient was chloroformed and a mixture of equal parts of dilute acetic acid and water was dropped down the nostril. About a cubic centimetre was used. There was violent sneezing, but no visible result. After waiting a few minutes the dose was repeated and was again negative. The next day it appeared that the injections had caused considerable irritation of the

mucous membrane. No eggs could then be found in the fæces. By May 12 no parasite had been seen and two samples of mucus obtained from the floor were negative. The irritation was now less, although there was a little sneezing and rubbing of the wing of the right nostril. On May 20 the nasal discharge had ceased and so had the desire to rub the nose, but there was an occasional sneeze.

It now appeared likely that the parasite had left the nasal cavity, passed into the stomach and so gained the exterior in the fæces. A search had been made for it and no eggs were discovered on microscopic examination. In view of the fact that eggs may infect man and so give rise to larval forms in the liver and other organs, it became a question of some importance to be absolutely sure that the dog was no longer dangerous in this respect. Microscopic examinations of swabs from the nostrils were made every other day for twelve days, and as they were all negative the animal was returned to its owner. It shows no signs of nasal irritation at the time of writing (July 10).

The points of interest seem to be the difficulty of judging the results of treatment and the responsibility of the practitioner in deciding that a treated dog is no longer a menace to man. Perhaps the first obstacle can be overcome by complete isolation on boards and careful examination of all the fæces passed.

With regard to the safety factor, it is extremely difficult to state anything very definite, because there are many gaps in our knowledge of the life history of the parasite. If a " worm " (or " worms ") is expelled and if the symptoms and eggs disappear it has to be remembered that there are many records indicating that the life cycle may take place in one host. Thus the adult has been found in the nasal cavity of ruminants, which harbour the larvæ in their internal organs, and early developmental forms have been reported from carnivora, the hosts of adult linguatules. I do not think, however, that autoinfection by swallowing eggs from the nasal cavity often occurs in the dog, because in the few *post-mortems* made on animals harbouring adults, larvæ have not been found, and also because the egg appears to require some time in the outer world. There are many intriguing possibilities in the life history but they are outside the scope of the present note.

REFERENCE.

(1) Fantham, Stephens & Theobald. Animal Parasites of Man. London, 1916 p. 524.

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# Translations

## The Treatment of Poll Evil in the Horse.*

By P. P. TIMOFEEFF,

*Surgical Dept., Clinic of Kaluga (U.S.S.R.).*

THE writer mentions the various forms of Poll Evil met with, Bursitis, which may be (1) serous and sterile, such can often be cured by a blister ; (2) infected bursitis, usually leading to fistula formation and Necrosis of the lig. nuchae. The usual treatment—as represented by laying open the tracts, and with abscesses, the making of counter openings, drainage, and antiseptic irrigation, is usually a long and tiresome one, and does not always cure the condition.

The writer began to use the radical operation method of Prof. Mirzel, which consists of section and removal of all diseased ligament nuchae and destruction of the subligamentous bursa. He has also taken up the method of local vaccination of Besredka by which the time required for healing is considerably shortened. Five case records are mentioned, of which four which were not responding to purely surgical handling, quickly improved after local autovaccination. Vaccines were made from pus obtained from the cases and were applied in this way. 1-2 ccs. of the culture filtrate were injected into the walls of the tract and 20-30 ccs. of the same filtrate were poured into the diseased cavity.

Repetitions on subsequent days took place as required, up to 5 doses in all, spread over 12 days.

The writer concludes with these dicta :

(1) Ordinary surgical treatment often effects no cure.

(2) The best surgical technique is that of Mirzel.

(3) Mirzel's technique combined with local autovaccination has given him surprising results. Suppuration is checked and healing follows quickly.

(4) Local autovaccination alone does not give successful results.

* From "Berliner Tierärztliche Wochenshrift," 1928.

## A Note on Besredka's Theory.*

WITH reference to diseases primarily affecting the skin Besredka asserts that the skin alone is the seat of the lesion and therapy must be applied locally to the diseased part.

Local Vaccination does not influence the Body as a whole ; the

* From Seuchen-bekämpfung.

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autogenous or Stock vaccine used does not act as an antigen, nor are antibodies formed in the blood. If the vaccine is introduced into the blood stream, it may in some local diseases have some beneficial result but not nearly so much as if it had been applied locally. In cases of local vaccination for such lesions as Poll Evil the vaccine operates in effect as a specific biological disinfectant thus having great advantage over the ordinary chemical antiseptics which are non-specific and are also apt to injure the body cells ; whereas the vaccine both checks the increase of the infection by acting on the organisms and also gives a power of resistance to the hitherto healthy tissue immediately surrounding the lesion.

For this reason, in practical application, the vaccine is most favourably applied direct to the lesion as a culture filtrate and also injected by syringe with the tissue immediately bounding the lesion.

Besredka says " Local Infection—Local Vaccination. Every irritant agent has its special cell ; every cell has its special immunity."

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# Reviews

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**The Way of a Man with a Horse.** By LIEUT.-COL. GEOFFREY BROOKE, D.S.O., M.C. With Veterinary Notes by Colonel A. G. Todd, R.A.V.C., D.S.O., and a chapter on Pigsticking by Lieut.-Col. Arthur Brooke, D.S.O., M.C. Pp. 288. With over 90 illustrations. Published by Seeley, Service & Co., Ltd., 196, Shaftesbury Avenue, London. Price 21/-

The name of Colonel Geoffrey Brooke, as an author, attached to any work connected with the horse gives an assurance of a multitude of readers.

The present book has interesting matter on every page. It contains chapters on Buying a Horse, Stable Knowledge and Routine when one has made the purchase, Riding, Riding to Hounds, Show Jumping, Management of Difficult Horses, and practically everything worth knowing connected with the horse in health.

The portion written by Colonel Todd (pages 102-161) is full of practical hints, although in some instances the details which are given would be better left to be prescribed by the veterinary practitioner in attendance.

The illustrations are certainly excellent, and we recommend the book to the notice of every sporting practitioner and veterinary student.

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**The Law Relating to Medical, Dental and Veterinary Practice.** By FRED. BULLOCK, LL.D., Barrister-at-Law. Pp. xvi. 317. Published by Messrs. Bailliere, Tindall & Cox. Price 12s. 6d. net.

Dr. Bullock, who is the Registrar and Secretary of the Royal College of Veterinary Surgeons, and a Barrister-at-Law, knows the legal aspect of the three branches of medicine, to which this book is dedicated, inside out.

It is an excellent idea that he has thought good to put down on paper a summary of the "Law Relating to Medical, Dental and Veterinary Practice" in such a concise and readable manner as is to be fourd in the present volume.

The book deals with the Statutes, Charters and Ordinances which rule the professional aspect of medicine, and in some 317 pages Mr. Bullock has compressed an immense amount of legal knowledge in readable form.

The book is one which we are quite sure will speedily run through its first edition, as it caters for so many different wants; not only in the medical, but also in the legal, world; and no barrister can possibly consider his library to be complete until a copy is found upon its shelves.

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To everybody who is interested in the "Law Relating to Medical, Dental and Veterinary Practice," this book is an essential companion, and one which no Veterinarian in busy practice can afford to be without.

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